



August 13, 1996

Mr. William F. Caton  
Acting Secretary  
Federal Communications Commission  
1919 M Street, N.W.  
Washington, D.C. 20554

Re: ET Docket No. 96-102

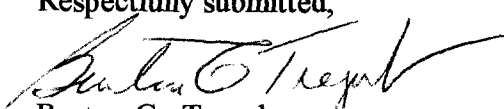
Dear Mr. Caton:

Enclosed for filing on behalf of Cylink Corporation are an original and ten copies of Reply Comments in the above-referenced docket.

Please date stamp and return the copy provided for that purpose.

If you have any questions, please do not hesitate to contact the undersigned.

Respectfully submitted,

  
Burton G. Tregub  
Vice President, Strategic Programs  
Cylink Corporation

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Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, D.C. 20554

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In the Matter of	)	
	)	
Amendment of the Commission's Rules to	)	ET Docket No. 96-102
Provide for Unlicensed NII/SUPERNet	)	RM-8648
Operations in the 5 GHz Frequency Range	)	RM-8653
	)	

To: The Commission

**REPLY COMMENTS OF CYLINK CORPORATION**

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August 13, 1996

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## SUMMARY

Cylink Corporation ("Cylink"), pursuant to the Federal Communications Commission's ("FCC" or "Commission") rules hereby submits its reply comments to the above captioned Notice of Proposed Rule Making. Cylink joins with most of the commentors in endorsing the changes proposed in this *Notice* for unlicensed low power short-range NII/SUPERNet operations in the 5.15 - 5.35 GHz band. Cylink also notes that many complex issues and contradicting proposals have been presented in the comments in this proceeding. Considerations for successful NII/SUPERNet operations in the lower band (5.15 - 5.35 GHz) are contrasted with the many difficulties of similar operations in the ISM upper band (5.725 - 5.875GHz) where a wide variety of high power amateur radio services and spread spectrum communications devices are currently active and ISM power emission limits and communications etiquette rules are not currently applicable. The comments also identify the regulatory policy<sup>1</sup> and technical complexities<sup>2</sup> of band sharing between low power short range high data rate services and longer range high data rate community networks.

Although informal assumptions and propositions, often conflicting, have been advanced, no commentor has offered any kind of data to prove with reasonable confidence that a technical and administrative solution can be developed and accommodated in the upper band between NII/SUPERNet devices and Part 15 spread-spectrum, ISM and amateur radio operations. Many commentors have expressed severe concerns about the difficulties of providing reliable disparate services with band sharing<sup>3</sup> at 5.8 GHz.

Cylink will participate in industry band-sharing development activities and continues to strongly urge detailed technical analysis, measurement criteria and demonstration testing in the 5.725 - 5.875 GHz band to determine, as TIA<sup>4</sup> has also recommended, if technical specifications and minimal regulations necessary to ensure successful sharing and low-burden administrative self-policing are attainable. Cylink therefore

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<sup>1</sup> TIA Comments at 6; AT&T Comments at 4.

<sup>2</sup> See Testimony of Peter Murray for UTAM, Inc. And the Wireless Information Networks Forum, February 20, 1996, e.g. "However, WINForum's spectrum estimate did not take such networks into consideration and community networks appear to require sufficient different protocol, channelization, and access measures from the on-premises, campus area, and local ad-hoc SUPERNet systems that an allocation in a different band is needed."

<sup>3</sup> Comments of San Bernadino Microwave at 6; Comments of Western Multiplex at 3; Comments of Cylink at 7; Comments of Pacific Telesis Group at 4; Comments of Amateur Radio Relay League at 6.

<sup>4</sup> TIA Comments at 3

specifically opposes any interim rules and specifications, particularly those posed by WINForum regarding possible interim deployments in 50 MHz of the upper band.

In view of other actions before the Commission<sup>5</sup> related to alternate spectrum resources available for NII/SUPERNet applications, it is evident that unencumbered spectrum significantly larger than the 150 MHz in the upper band can be made available for NII/SUPERNet services, if co-sharing is not deemed possible in the 5.8 GHz band. Deployment of such services as 25 Mbps ATM are not expected to capture significant market presence before 1998<sup>6</sup>. This is consistent with timing of deployment of the technologies stimulated for use under the other Commission actions, and eventual growing occupancy of the 200 MHz of the lower spectrum should provide proof and motivation for investment and deployment in these alternate technologies and devices<sup>7</sup>.

Cylink also joins with many of the commentors, e.g., Pacific Telesis Group, TIA, AT&T Corp., ARRL, and Bell Atlantic, in supporting the position of the Commission in refusing to propose accommodating the higher power longer range communications links sought by the petitioners at this time. Cylink believes that the FCC's implementation of the Telecommunications Act of 1996, effective subsequent to the petitioners' submissions, provides a vigorous competitive environment for community networking solutions, with diverse technologies and providers. This will change the telecommunications landscape and obsolete many of the assumptions about lack of economic competitive services and devices in many spectrum bands for both unlicensed and licensed operations.

The Telecommunications Act will stimulate a great diversity of grades and qualities of community networking services through new devices and carrier and private facilities. The NII/SUPERNet Proceeding itself provides a powerful market-driven engine to force this change, and the Commission has wisely provided the opportunity for the Act to take effect.

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<sup>5</sup> ET Docket 96-8 (*Amendment of the Commission's Rules Regarding Spread Spectrum Transmitters*), ET Docket 94-124 (*Amendment of Parts 2 and 15 of the Commission's rules to Permit Use of Radio Frequencies Above 40 GHz for New Radio Applications*) and CC Docket No. 92-297 (*LMDS FIRST REPORT AND ORDER*)

<sup>6</sup>Network World, July 29,1996 at p.32

<sup>7</sup> Pacific Telesis Group Comments at 3.

## **DISCUSSION**

### **I. Introduction**

As one of the country's leading suppliers of spread spectrum technology for outdoor communications, Cylink has extensive experience in the development and deployment of point-to-point high data rate links in the 2.4 and 5.8 GHz bands for unlicensed operations in community, carrier utility, and private commercial network applications. These links currently provide wideband communications facilities for schools, public safety and health care institutions and businesses.

The spread spectrum devices produced by Cylink and other Part 15 suppliers, provide for any entity, now in 1996 and for the foreseeable future, immediate economically deployable longer range NII access and connectivity facilities desired by many of the commentors in this proceeding. In order to continue successful provisioning of these communications facilities and devices, and efficiently meet a variety of publicly beneficial needs, these reply comments primarily address proposed NII/SUPERNet operations in the 5.8 GHz band.

### **II. Continued Success of Spread Spectrum Point-to-Point Links in the 5.8 GHz Band Remains in the Public Interest.**

The market demands for and public benefits of medium and longer range (up to 30 miles) outdoor spread spectrum communications, operating under Part 15 rules, have been previously documented in ET Docket No. 96-08<sup>8</sup> and in this proceeding.<sup>9</sup> Rapid deployment and taking advantage of spread-spectrum's interference resistant technology allows efficient re-use of precious spectrum resources through sharing by many users in the same community. This enables the type of connectivity consistent with the Telecommunications Act of 1996 in encouraging the ready availability of advanced telecommunications capabilities to all Americans including, in particular, schools, libraries and health care facilities.

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<sup>8</sup> Cylink Comments at 2 - 8

<sup>9</sup> Cylink Comments at 5; Western Multiplex Corporation Comments at 2; Metricom Comments at 2.

The FCC has confirmed that unlicensed spread spectrum radio technology can help extend universal service and serve as a low-cost, high-bandwidth on-ramp to the NII Information Superhighway. The Commission recently observed that “Part 15 devices provide a variety of consumer and business oriented services that benefit individuals, commercial services, and private spectrum users and . . . have applications for public safety and medical needs.”<sup>10</sup> Spread-spectrum devices are also used for cross-county community and business communications, Intelligent Transportation System applications, rural telephone services and emergency restoration services.

Comments in this proceeding recognize the complexity of the issues in sharing the spectrum resources among the different technologies and etiquettes provided and applications served within the 5.8 GHz band, which could result in ultimately rendering the band useless or burdened with uncertainties from the reliability and administrative perspectives of providing any service. Conflicts associated with compatibility and interim rules could well result in another range of delays and administrative burdens akin to the procedures in the LMS Services PR Docket 93-61.

**III. Reliable Band Sharing Operations Must be the Goal Among Part 15 Spread Spectrum and NII/SUPERNet Devices at 5.8 GHz in Order to Maximize Public Benefits; the Proposed Technical Requirements of Section 15.407 are Incomplete and do not Achieve This Goal and the Requirements of Section 15.411 Conflict with Part 15 Spread Spectrum Operations.**

**A. Band Sharing Interference Considerations at 5.8 GHz.**

There is a general consensus among commentors and the Commission that spread spectrum devices operating in the 5.8 GHz band have provided and will continue to provide valuable public benefits and that if NII/SUPERNet devices are authorized in this band, they:

Must not impose additional restrictions nor require any new limitations on Part 15 spread spectrum devices operating in this band either now or in the future, and

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<sup>10</sup> Allocation of Spectrum Below 5 GHz Transferred from Federal Government Use, 10 FCC Rcd 4769, 4786 (1995).

Must not cause objectional or harmful performance-disabling interference into existing and future spread spectrum devices operating in this band to any greater degree than other Part 15 spread spectrum devices.

Cylink vigorously supports these basic band sharing tenets in order to protect and further the public benefits achieved through the investments made by Cylink and other members of the Part 15 community based on the technical regulations established and encouraged by the Commission.

WINForum recommends<sup>11</sup> that the most technology-neutral criteria for band sharing appears to be power spectral density and urges adoption of rules consistent with whatever limits are adopted in ET Docket 96-08. Motorola<sup>12</sup> also suggests the specifying of power spectral density (PSD) as the defining technique for controlling and measuring interference among multiple non-interoperable systems. However, their examples, even correcting for normalization of antenna gain to measure PSD as a function of transmitter output power, are oversimplified and incomplete.

Any effective solution for sharing the 5.8 GHz band must take into account the specifics of PSD measurement criteria and of the time-variant and binary data-sequence structure dependencies of NII/SUPERNet non-spread spectrum modulation technologies. Unlike spread-spectrum devices, field-experience of the “peakiness” of the operational emissions spectrum will be radically different than laboratory testing unless a broad range of data sequences are measured over sufficient periods of time to represent true environments. This testing requires a large sampling of data sequences that, based on the modulation techniques employed, can combine to produce large spikes from data dependent sequences.

As many of the commentators previously referenced have noted, identifying interference parameter constraints to design proper systems requires analyses, testing and demonstration; it is not subject to theoretical arguments alone. Unless this is performed and agreed upon through expert peer reviews, the public will be the losers in an environment with uncertain interference predictability and unreliable performance.

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<sup>11</sup> WINForum Comments at 19.

<sup>12</sup> Motorola Comments at 9.



Northern Telecom Inc. ("Nortel") proposes that<sup>13</sup> NII/SUPERNet devices in the 5.8 GHz band be permitted an EIRP of up to one watt, subject to limitations of Part 15.407 (d) in order to ensure non-interference to licensed devices (emphasis added) in order that NII/SUPERNet devices are compatible with other authorized services (emphasis added) in this band. Cylink suggests that this definition implicitly excludes considerations of harmful or objectionable interference to Part 15 spread spectrum devices which are neither licensed or formally defined as an "authorized service" by FCC statute, and adamantly opposes Nortel's proposals for incorporation into interim or final rules.

Comments by several other parties<sup>14</sup> do not take into account the spectrum signature differences between spread spectrum and non-spread spectrum devices. Cylink has presented the requirements<sup>15</sup> that spread-spectrum signals provide a certain amount of randomness in the signal structure achieved partially by the fact that the transmitted power is spread, utilizing a pseudo-noise code, into a bandwidth at least ten times that which would be required if spread spectrum modulation were not used. This results in very few spectral components within a smooth spectral mask and is one of the major reasons why multiple signals can co-exist within the same band and geographic area. Non-spread spectrum emitters, regardless of whether or not used for NII/SUPERNet applications, have spectral signatures that exhibit strong binary data-sequence dependent spectral components that can vary over time with a much greater potential for harmful interference with other like emitters and to Part 15 spread spectrum devices.

This is apparently identified by Nortel<sup>16</sup> in recognizing the need to change the Commission's proposed specification for defining power spectral density in Section 15.407(a) relative to the limitation of PSD to 0.03 milliwatts in any 3 kHz bandwidth. Nortel further acknowledges the difference in smoothness between spread spectrum and data-dependent spectral characteristics of non-spread spectrum emission characteristics in their statement that ... "For devices with a bandwidth of 25 MHz, this would require the emission to be flat across the channel to within 3 dB. Nortel's experience has been that this is not practical to achieve for all

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<sup>13</sup> Nortel Comments at 12 - 13

<sup>14</sup> e.g., Apple Comments at 8; Fundamental Research Corp. Comments at 2.

<sup>15</sup> Cylink Comments at 8.

<sup>16</sup> Nortel Comments at 13.

conditions of modulation. Nortel thus suggests that the proposed spectral density limit be increased to 0.06 milliwatts per 3 kHz to provide an additional 3 dB of margin.”

This recognition reflects the absolute necessity for performing detailed analyses, testing and demonstrations of differing technologies, etiquettes, using common measurement principles, before compatible co-sharing of the 5.8 GHz upper band can be ensured to provide reliable public services for the mix of applications facilitated by Part 15 spread spectrum and NII/SUPERNet non-spread spectrum services.

B. Shortcomings Exist in Technical Requirements Section 15.407(a) for Band Sharing Between Part 15 Spread Spectrum and Non-Spread Spectrum Devices at 5.8 GHz.

**Any technical specification for sharing among non-spread spectrum and spread spectrum emitters must take into account the techniques by which transmitted power density measurements are taken as specified by FCC Section 15.247(d). The proposed Section 15.407(a) omits a very essential measurement characteristic which must be included. Section 15.247(d) defines that the measurement of transmitted power spectral density is to be “averaged over any 1 second interval.” This time frame is to capture repetitive sequences of the pseudo-noise spreading code used to modulate the data structure. Since a non-spread spectrum modulation emission signature is data-structure dependent, a time interval for ensuring compliance with the intent of the measurement technique must be included in any final technical requirement Section. This time interval will have to include an appropriate large sampling of binary data sequences to develop a full range of spectral emission signatures.**

In order to establish whether economical and compliant equipment for NII/SUPERNet can be developed and manufactured to attain band sharing with existing Part 15 devices and services, all developers and manufacturers of NII/SUPERNet devices must also conform to the PSD measurement techniques established by the Commission. Such a requirement does not exist in the lower band of 5.15 - 5.35 GHz. The FCC’s position on appropriate measurement methods for determining compliance with the power spectral density requirements of Section 15.247 of the Commission’s Rules are reenforced in a March 25, 1993 letter from David L. Means, Chief, Engineering Evaluation Branch to Dr. Jim Omura, Chairman, Cylink. This letter states:

“Review of the record in the rule making that established the power spectral density standard, General Docket 89-354, reveals the Commission’s actual intent. Paragraph 12 of the Report and Order in this proceeding states:

...We find that a power spectral density standard based on 1 watt spread over the minimum permitted bandwidth of 500 kHz is an appropriate solution. This standard will specify that the maximum allowed power spectral density is 8 dBm in any 3 kHz bandwidth. ...

“The actual calculation that produced the specified value of 8 dBm is as follows:

$$1 \text{ W (peak)}/500 \text{ kHz}/3\text{kHz}) = 0.006\text{W (peak)} = 7.78 \text{ dBm (rounded to 8 dBm)}.$$

“It is clear from the above that, since the maximum power output of the transmitter is specified by Section 15.247 (b) as 1 Watt peak power, the value measured in the 3 kHz bandwidth must also be peak. The 1 second measurement observation period was chosen as a value that reasonably assured capture of recurring peaks, while not being so long as to create an unreasonable measurement burden.

***“This interpretation of the Commission’s intent has been constantly applied since the standard was implemented on August 24, 1990. While we remain flexible regarding the measurement procedure and equipment, we must insist that whatever is used yields a peak power measurement.”*** (Emphasis added).

Therefore, Cylink proposes that any general technical requirement which defines the quantification and measurement technique of power spectral density for NII/SUPERNet devices in the 5.725 - 5.875 GHz band must, by regulation, include the definitions presented above. Cylink consequently opposes the suggested language by the Commission for Section 15.407(a) as incomplete based on current regulations and policies set for developers of Part 15 devices.

C. Shortcomings Exist in Technical Requirements Section 15.411 for Band Sharing Between Part 15 Spread Spectrum and Non-Spread Spectrum Devices at 5.8 GHz.

There are many contradictory proposals for spectrum etiquette and protocols offered by the commentors in this proceeding; citing them would take a page full of footnotes. Obviously, resolving these conflicts, either through channelization plans, compromise, elimination of services, or some other means, will be a major challenge for the industry working group. As a single reference, one proposal<sup>17</sup> would prohibit continuous point-to-point communications at all, and particularly full duplex as is common commercial and network practice. This would preclude many Cylink customers, and those of other Part 15 manufacturers, from serving such current applications as telephone trunking for rural and farm communities, videoconferencing for schools, public service, Intelligent Transportation Systems and health care facilities, and other business or community multimedia networking applications.

The problems of establishing compatible frameworks for circuit-switched networks and packet-switched communications are at the heart of these etiquette issues. When combined with the inability to eliminate amateur radio communications or new non-communications Part 18 ISM devices which are not limited in power or continuity of transmission, the band sharing problem at 5.8 GHz may not be tractable. Hence, while Section 15.411 may be a basis for compromise in the lower 5.15 - 5.35 GHz band, it does not address the complete set of concurrent emitters that can exist in a 5.8 GHz environment.

It will have to be determined through the industry technical specification development process whether such requirements and constraints can lead to workable NII/SUPERNet systems in the 5.8 GHz band. There is common motivation to find such a solution among the variety of technologies and services operational at 5.8 GHz. The ability to efficiently share this spectrum without changing any of the Section 15.247 or 15.249 rules or degrading or interrupting current Part 15 spread spectrum devices and negatively effecting operations would clearly result in similar satisfactory operations in the 5.15 - 5.35 GHz band. This could stimulate the submission of a Petition for Rulemaking for Part 15 spread spectrum operations within this lower band by Cylink and other Part 15 suppliers and customers, to expand wideband spread spectrum facilities by an additional 200 MHz, significantly increasing capacities for additional unlicensed longer range NII/SUPERNet and outdoor community networking applications.

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<sup>17</sup> Lace, Inc. Comments at 12.

#### **IV. Any Proposal to Adopt a "Part 16" Regulatory Scheme Must Explicitly Include Part 15 Spread Spectrum Devices and Services.**

While several commentors have suggested adopting the Apple proposal for an unlicensed "Part 16" regulatory regime for the NII/SUPERNet service, it is unclear from Nortel's comments<sup>18</sup> as to whether or not Part 15 spread spectrum devices are included in their proposal for co-primary status with other licensed services. Nortel raises the concern that without such a protected status, users would be subject to interference by other licensed services and compromise the reliability for NII/SUPERNet communications.

Cylink cites this as another acknowledged example of the dangers fraught by use of the 5.8 GHz band for NII/SUPERNet services. The upper band of 5.8 GHz is basically inhospitable for many of the services contemplated by the petitioners, and band sharing expectations are based upon sets of wholly unproven assumptions relating to technologies, regulations and future investments in ISM devices which are not under the total control of either the Commission or the specific petitioners. However, if the Commission does establish a Part 16 regulatory regime, it must include Part 15 spread spectrum devices and services in order to maintain equitable band sharing to maximize public benefits being received by current and future users of spread spectrum facilities. Placing Part 15 devices secondary to NII/SUPERNet would be counter to all commitments and pronouncements which have resulted from the successes that Part 15 facilities have enjoyed in the marketplace.

#### **V. Part 15 Companies Already Furnish Longer Range Unlicensed Communications Links to Meet NII/SUPERNet Community Networking Requirements; Commentors Cannot Neglect the Responsibilities for Sound Professional Communications Path Engineering Practices for Establishing Such Links.**

Cylink and other Part 15 suppliers and their distributors and customers are well versed in the deployment of longer range outdoor communications facilities such as might be employed in unlicensed long distance wireless access<sup>19</sup> or community networks for NII/SUPERNet users. The benefits and experiences have

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<sup>18</sup> Nortel Comments at 13.

<sup>19</sup> Western Multiplex Comments at 2.

already been cited by many commentors and are documented in the proceedings for ET Docket 96-08 as well as in this proceeding<sup>20</sup>. Currently available products provide E-1/T-1 and fractional rates from 2.048 Mbps to 64 Kbps for distances of approximately 30 miles; Internet and NII infrastructures to accept greater rates are not projected to exist for several years, by which time newer services and spectrums will be available through actions taken in other dockets described previously in this *Notice*<sup>21</sup>.

Typical LAN segment interconnections between campuses or businesses generally require fractional T-1 rates at best, based on Cylink's and other vendors' experiences with wireless LAN bridges. Even newly designed LAN based videoconferencing services are designed to operate at ISDN basic rates, well below the capacity of Part 15 outdoor longer range spread spectrum wireless links. Hence, Part 15 unlicensed spread spectrum facilities, available today, reduce any urgency in developing new technology regulations to accommodate immediate NII/SUPERNet needs for longer range communications.

However, the unlicensed nature of these links should not be confused with the professional care required to install such facilities. Several commentors<sup>22</sup> seem to imply that newly defined unlicensed NII/SUPERNet outdoor communications facilities, either longer range or short distance, will be superior in providing new ease of access as consumer installable and maintainable products, rather than products that provide consumers with communications facilities. This is not a factual incentive or potential new public benefit, and should not be a motivating premise for either the Commission or the potential users of such services.

The fact that the majority of the links envisioned in an NII/SUPERNet environment are unlicensed does not mean that outdoor communications devices can be consumer installed. Indeed, professional installation is generally required and prudent in order to achieve reliable operations and to knowledgeably practice spectrum ecology through the use of minimum transmitter power and antenna beamwidth necessary to establish reliable connectivity.

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<sup>20</sup> Cylink Comments at 4.

<sup>21</sup> Cylink Comments at 3.

<sup>22</sup> Comments of Fundamental Research at 3; Comments of CEMA at 5; Comments of Apple at 4.

Fixed point-to-point unlicensed links still require a site analysis and path survey to determine that the spectrum is clear of direct interference and has a reasonable probability of remaining so. The link must accept some interference from other intentional or unintentional emitters, and a reliable line-of-sight must exist between one location and another. It is extremely unlikely that one would expend the resources for a comparatively long range point-to-point link, such as would be used to connect campuses, without first determining that a line-of-sight path actually exists and that there are no nearby sites that would pose interference concerns. An installer would also assess the likely radio noise environment at the site; steps of this kind are necessary in order to guard against an improvident decision to invest and install a link of doubtful utility because of a questionable interference environment.

This concern is more manifest in the NII/SUPERNet environment because of the mobility and informality with which wireless LANs and short outdoor links may be supported. Wireless LAN configurations, essentially unrestricted in location, may be installed next to windows or open areas where omnidirectional or poorly aligned directional antennas can spew emissions into the local environments well outside of the targeted recipients and thus poison the local geography for other communications. The movement of indoor petitions, for example, can lead to narrow beam directional gain signals, meant for indoor communications of 40 meters, causing co-channel interference with other communications facilities in adjacent areas or buildings.

Absent a metric for outdoor field strength determination as a self-policing measure by an interfered party, a non-intelligent wireless LAN system can cause a chaotic electromagnetic environment. Cylink is also concerned that, given the informality of installation processes for wireless LANs, an unpoliced aftermarket could emerge whereby devices designed for higher power longer range communications could be adapted and affixed to indoor LAN products. This scenario could be avoided by avoiding the use of the higher power interoperable non-spread spectrum NII/SUPERNet devices at the 5.8 GHz band.

Similarly, an outdoor short-range building-to-building link without professional installation can cause unnecessary harmful interference to a broad area through improper antenna directionality or beam pattern, excess transmitter power above that which is needed to establish a reliable link margin, or as a result of the lack of instrumented path engineering. Cylink suggests that the members of this proceeding not confuse the public between the ease of access provided by unlicensed spread spectrum and NII/SUPERNet operations, and the professional efforts and expenses required to benefit an entire set of users in a common geographic

area or community through planning and engineering of both indoor and outdoor services.

While professionally engineered ad-hoc installations of spread spectrum technology generally succeed, non-spread-spectrum technologies require even more thorough path engineering and robust carrier-to interference environments to protect against co-channel or adjacent channel interference. Because frequency coordination is not required in unlicensed operations, risks of investment are much greater in achieving long term reliability for non-spread-spectrum devices with multiple point-to-point links sharing the same geography and spectrum. Thus, the successful experience enjoyed by spread spectrum customers will not directly translate to unlicensed ad-hoc non-spread spectrum link topologies.

**VI. Unlicensed Community Networking is a Reality Now; The Commission's Decision Not to Accommodate Higher Power Longer range Communications at This Time is Appropriate Because of the Broad Range of Alternatives in the Marketplace.**

A. The Concept of Unlicensed Longer Range Community Networks is Already a Reality with the Choices Owned by the Public, not the Suppliers.

The Commission finds merit in the concept of longer range community networks, broadly defined as capable of carrying high data rate communications for distances of 10 - 15 km or more. Cylink asserts that such facilities are available now and that new spectrum and competitive regulatory actions will rapidly develop a host of alternatives from which consumers, not vendors, will choose the winners. It would not serve the public well to identify only one particular architectural concept as "the" definition of such longer range community networks. Thus, while there are substantial issues concerning the Apple proposal for accommodating such networks, flaws in the Apple presentation should not tarnish alternative implementations which have more promise and less risk to the low power short range NII/SUPERNet services and to the Part 15 spread spectrum devices already in service in the upper 5.8 GHz band.

Apple's comments represent that "With respect specifically to longer reach "community networks," the Commission has overemphasized the risk of harmful interference..."<sup>23</sup> and Apple states that "community networks have been tarred with the false and misleading label of "high power" and somehow differentiated

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<sup>23</sup> Apple Comments at I.



from other applications allowed the same power.”<sup>24</sup>

Cylink, as a leading supplier to community network applications today, is obviously a broad supporter of such networks, but asserts that Apple’s own specific definition and implementation plan for such networks is flawed. Facilities and devices for unlicensed private community networks exist today, and as communications “pipes,” do not have to be cast in the single image of one vendor. Rather, they are provided through a vigorous competitive mix of offerings. Consumers of networking services interface with facilities through standardized high speed data communications ports and are interested in the physical connections and the performance of the link relative to quality, grade, economics and availability of service. The underlying system components can be fungible; the consumers buy the benefits of communications, not the technologies.

Apple is factually incorrect when they claim<sup>25</sup> that “traditional fixed microwave networks licensed under Part 94 of the Commission’s rules are orders of magnitude more expensive than unlicensed links...” The costs of any outdoor communications link are system costs, inclusive of cable run construction, site preparation, professional communications path engineering<sup>26</sup>, antenna and tower construction, and perhaps real estate leasing costs for rooftop space. The cost of the transceivers are only a portion of the total costs. The advantages of spread spectrum technology are more permanent in the strength and adaptability of the technology to inherently tolerate communications energy interference, sustain reliable services in multipath environments, lessen administrative delays, and provide effective spectrum reuse and low maintainability costs through other attributes unique to the characteristics of spread-spectrum.

Many reservations have been presented concerning Apple’s specific implementation plans. Specifically, the ARRL<sup>27</sup> states that “...non-spread spectrum devices, with no bandwidth limitations, at significant power and antenna gain, operating over the 15 km paths that Apple envisions, are not compatible with co-channel amateur operations.” Cylink believes that Apple has not provided any additional technical data to support its

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<sup>24</sup> Apple Comments at 8.

<sup>25</sup> Apple Comments at 5.

<sup>26</sup> *id* at 8.

<sup>27</sup> ARRL Comments at 8.

assumptions of effective band sharing in the 5.8 GHz spectrum, first presented in its Petition for Rule Making , RM-8653, to which the ARRL responds<sup>28</sup> in part: "...and there is no showing of compatibility between the so-called "NII" (National Information Infrastructure) band allocation proposed by Apple, and existing Government and non-government users (including Part 15, Part 18 and Part 97 users). The petition is rife with glowing predictions of universal access by the public for whatever communications purposes are desired, but it contains no real information about the possibility of coordination of use between and among unlicensed users in the bands, or coordination between and among inter-service users."

Cylink believes that the risk of compromising the effective services of Part 15 spread-spectrum devices already in the 5.8 GHz band providing unlicensed longer range communications is totally unwarranted. As pointed out by the Wireless Field Test for Educations Project<sup>29</sup> ... "Since radios operating under Part 15.247, in 125 MHZ of bandwidth at 1 watt are capable of providing such shared spectrum service at ranges at least as far as the Apple Computer proposed 15 km, without any new service such as Apple Computer's proposed service, further rulemaking by the FCC should not encourage degradation of that existing capability."

Likewise, Cylink asserts that the full utility of NII/SUPERNet LANS is not limited if Apple's specific implementation plan is denied; rather, community networking is an application served by the whole telecommunications industry with a variety of implementations---unlicensed and licensed wireless, wire, cable---through a myriad of different competitive technology products and services expanded by the FCC's actions under the Telecommunications Act of 1996. The FCC, through various current proceedings, has wisely set the scenario for market forces to develop multiple offerings for unlicensed and licensed communications, and the success of the NII/SUPERNet is not inextricably linked to the specifics of Apple's own plan.

**B. Cylink Supports the Commission's Decision not to Accommodate the Higher Power Longer Range Communications Links in this Proceeding.**

In apparent contradiction to what the Commission reported in paragraph 47 of this *Notice*, the Commission should be complimented for already taking action to expand the broad number of alternatives to provide both

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<sup>28</sup> ARRL Comments at 3.

<sup>29</sup> NSF Wireless Field Test Project Comments at 3.

unlicensed and licensed longer range communications for NII/SUPERNet applications. In addition to the previously discussed capabilities of Part 15 spread spectrum devices to meet current and near term NII/SUPERNet applications for access and infrastructure communications, Cylink believes that the FCC's implementation of the Telecommunications Act of 1996, effective subsequent to the petitioners' submissions, provides a vigorous competitive environment for community networking solutions, with diverse technologies and providers. This will change the telecommunications landscape and obsolete many of the assumptions about lack of economic competitive services and devices in many spectrum bands for both unlicensed and licensed operations.

The Telecommunications Act will stimulate a great diversity of grades and qualities of community networking services through new devices and carrier and private facilities. The NII/SUPERNet proceeding itself provides a powerful market-driven engine to force this change, and the Commission has now wisely provided the opportunity for the Act to take effect.

Cylink also suggests that the Commission already has before it, through existing dockets addressing the same public users and uses of NII/SUPERNet type services, a number of alternatives to the 5.725 - 5.850 GHz band for fixed point-to-point longer range outdoor wireless communications. These can provide the services proposed in the *Notice* without compromising the status quo quality of communications for the public who currently benefit from Part 15 spread spectrum devices, nor jeopardizing the millions of dollars of investment that have led to American leadership in the global market for 5.8 GHz spread spectrum devices.

Cylink suggests that integrating the collective objectives and spectrum resources addressed within this *Notice*, and ET Docket 96-8 (*Amendment of the Commission's Rules Regarding Spread Spectrum Transmitters*) and ET Docket 94-124 (*Amendment of Parts 2 and 15 of the Commission's rules to Permit Use of Radio Frequencies Above 40 GHz for New Radio Applications*), in conjunction with the use of other existing spectrum allocations will provide spectrum-efficient answers to long term demands for the needs identified in this *Notice*. Similarly, in lieu of introducing potentially interfering non-spread spectrum technologies in the 5.8 GHz band for longer range outdoor community networking communications for NII/SUPERNet applications, ET Docket No. 96-8 can provide for the routine unlicensed authorization of outdoor point-to-point links in the 2.4 GHz and the 5.8 GHz bands.

Other alternatives for outdoor communications have been identified in the proceeding for ET Docket 94-124, as higher power medium-range or last-mile components of any information superhighway. These applications were particularly cited as of value in educational institutions, with one commentor, "Educational Parties," proposing 1 GHz allocation set-aside for educational and public service uses.

Finally, the commission has identified a range of potential spectrum resources in paragraph 93 of the LMDS Report and Order<sup>30</sup> wherein it is stated ... "However, the fact that all new FS applications files in these (6 and 11 GHz) bands have been granted, suggests that there is ample spectrum available to meet FS service demands. Moreover, for short haul routes, there are assignments available in the 18, 23 and 39 GHz bands. These bands represent almost 8 GHz of spectrum for FS. In addition, in ET Docket no 92-9, the Commission redesignated the 10 GHz band for point-to-point microwave use, and in ET Docket No. 95-183, the Commission proposed to provide another 1.6 GHz of FS spectrum in the 37.0-38.6 GHz band.... Given the capability of FS networks to make effective and efficient reuse of spectrum, we conclude, based on the current record, that sufficient spectrum is available to meet FS requirements for the foreseeable future."

#### **VII. In This Proceeding, Interim Rules Would be Anticompetitive to Small Businesses and Place Early Customers at Risks of Obsolescence.**

Because of the complexities involved in this proceeding, both the public and business would be ill-served by deployments of devices under interim rules. The suggested procedures for analyses, testing and demonstrations to verify the potential for band sharing at the 5.8 GHz band make it extremely unlikely that interim rules could be hastily adopted. Since services to be adopted may differ between the lower band of 5.15 - 5.35 GHz and the upper band of 5.725 - 5.875 GHz, and channelization could well partition services into different bands and performance levels, small manufacturers would be at substantial risk in developing products for what may later turn out to be minor market niches. Only larger companies could afford to cover their risks by "betting" on the eventual outcomes of the industry working group deliberations.

Likewise, the public could well be at risk through purchasing devices or implementing services which did not become heavily supported by multiple suppliers, because of later changes in band usage definitions and

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<sup>30</sup> First Report and Order and Fourth Notice of Proposed Rulemaking, CC Docket no. 92-297, Released July 22, 1996.

service offerings. Cylink does not believe that solving interoperability issues solves the problem, since obsolescence can be more a function of where the major product developments take place to provide the most cost-effective alternatives for the customers. Therefore, Cylink agrees with the position of Hewlett-Packard<sup>31</sup> to forego interim rules and have the Commission direct industry to develop standards through a peer review consensus process within a fixed period.

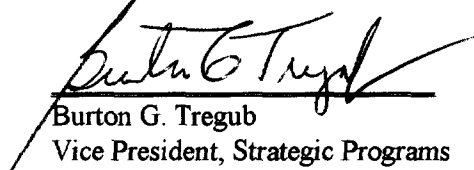
#### **VIII. Conclusion.**

Cylink commends the Commission's efforts to expand the capabilities of unlicensed devices to provide important new capabilities to the public. Through the efforts involved in associated spectrum dockets, enactment of the provisions of the Telecommunications Act of 1996, and the specifics of the services envisioned for NII/SUPERNet applications, the Commission can facilitate meeting the projected public needs across a variety of competitive telecommunications solutions. With the important modifications to the technical requirements outlined, and the recommendations and clarifications described above and in Cylink's initial comments, Cylink generally supports the rule changes proposed by the Commission in the referenced Notice of Proposed Rule Making.

Respectfully submitted,

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Dated: August 13, 1996

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<sup>31</sup> Hewlett-Packard Comments at 4.